

ANNEX: Metrics Framework for Human-AI Symbiosis v3.3

****A Comprehensive Measurement System with Unified Scoring****

Document Information

****Version**:** 3.2 → 3.3 □ ****UNIFIED SCORING SYSTEM****

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****Changes in v3.3 (December 2025):**** □ ****23 VECTORS INTEGRATION****

- □ ****USS (Unified Scoring System)**** — единая шкала 0-1 для всех метрик
- □ ****CSI (Composite Symbiosis Index)**** — мастер-метрика симбиоза
- □ ****HCI (Human Capability Index)**** — качество людей из V18
- □ ****HAI (Human Agency Index)**** — агентность людей из V22
- ⚙ ****TDI (Technical Debt Index)**** — техническое здоровье из V04
- □ ****Fragmentation Metrics**** — метрики AGI-фрагментации из V19
- □ ****Cultural Hegemony Index**** — культурное разнообразие из V15
- □ ****AGI Maturity Levels**** — уровни зрелости AGI из V17
- □ Integration with 23 Vectors Framework
- □ Unified conversion formulas for all legacy metrics

Executive Summary

This Annex provides a comprehensive metrics framework for measuring Human-AI Symbiosis. ****Version 3.3 introduces the Unified Scoring System (USS)**** — a

standardized 0-1 scale for all metrics, enabling direct comparison and aggregation across the entire Symbiotic Codes framework.

****Key Innovations in v3.3:****

- 1. ****USS (Unified Scoring System)**** — All metrics normalized to 0.00-1.00
- 2. ****CSI (Composite Symbiosis Index)**** — Single master metric combining all dimensions
- 3. ****8 New Metrics**** from 23 Vectors Framework
- 4. ****Unified Thresholds**** — Consistent alert levels across all metrics
- 5. ****Conversion Formulas**** — Legacy metric integration

****Critical Update:**** The 23 Vectors Framework has identified gaps in the previous measurement system. This version addresses all identified gaps and provides complete coverage of Human-AGI symbiosis dimensions.

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PART 0: FOUNDATIONAL PRINCIPLES

(Unchanged from v3.2 — see previous version for full text)

0.1 S(s) Formula — Empirical Foundation □

****The Canonical Stability Formula:****

...

$$S(s) = (E + A + G) / (R + C + U)$$

Where:

E = Efficiency (economic productivity, resource utilization)

A = Adaptability (innovation capacity, learning rate, institutional flexibility)

G = Generativity (R&D output, entrepreneurship, value creation)

R = Resistance (bureaucracy, regulatory friction, structural rigidity)

C = Corruption (institutional decay, rent extraction, trust erosion)

U = Uncertainty (volatility, unpredictability, policy instability)

Thresholds (empirically validated):

$S(s) < 0.5$: Collapse zone (immediate intervention required)

$S(s) 0.5-1.0$: Unsustainable (crisis likely within 3-5 years)

$S(s) > 1.0$: Sustainable (system stable)

$S(s) > 1.2$: Resilient (capable of absorbing shocks)

$S(s) > 2.0$: Antifragile (strengthened by stressors)

...

PART 1: UNIFIED SCORING SYSTEM (USS) □ ****NEW****

1.1 USS Definition and Rationale

The Problem

Previous versions of Symbiotic Codes used inconsistent scales:

- Some metrics: 0-1 (normalized)
- Some metrics: 0-100 (percentage)
- Some metrics: 1-5 (ordinal)
- Some metrics: -2 to +2 (bipolar)
- Some metrics: 0-10 (decimal)
- Some metrics: ratios (0- ∞)

This inconsistency made:

- ☐ Cross-metric comparison difficult
- ☐ Aggregation impossible
- ☐ Threshold interpretation confusing
- ☐ Dashboard design fragmented

The Solution: USS

****USS (Unified Scoring System)**** normalizes ALL metrics to a single scale:

...

USS SPECIFICATION:

Range: 0.00 — 1.00

Precision: 2 decimal places

Direction: Higher = Better (ALWAYS)

Neutral Point: 0.50

Target Zone: 0.75-0.90

...

****Key Principle:**** Every metric, when converted to USS, follows the same rule:

- ****0.00**** = Worst possible state

- **0.50** = Marginal/borderline
- **0.75** = Good/healthy
- **1.00** = Optimal/excellent

1.2 Conversion Formulas

Standard Conversions

```
```python
```

```
For scales 0-100 (percentages):
```

```
USS = value / 100
```

```
For scales 0-10:
```

```
USS = value / 10
```

```
For scales 1-5 (ordinal):
```

```
USS = (value - 1) / 4
```

```
For scales -2 to +2 (bipolar):
```

```
USS = (value + 2) / 4
```

```
For binary (true/false):
```

```
USS = 1.0 if true else 0.0
```

```
For S(s) ratio (0 to ∞):
```

```
USS = min(S(s) / 2, 1.0) # S(s)=2.0 maps to USS=1.0
```

```
For inverse metrics (lower = better):
```

```
USS = 1 - (value / max_value)
```

```
```
```

Special Conversions

```
```python
```

```
TDI (Technical Debt Index) — inverse metric
```

```
Original: 0 = no debt (good), 1 = max debt (bad)
```

```
USS_TDI = 1 - TDI
```

```
Risk Score — inverse metric
```

```
Original: 0 = low risk (good), 10 = high risk (bad)
```

```
USS_Risk = 1 - (Risk / 10)
```

```
Corruption — inverse metric
```

```
Original: 0 = no corruption (good), 1 = max corruption (bad)
```

```
USS_Corruption = 1 - C
```

```
Uncertainty — inverse metric
```

```
Original: 0 = certain (good), 1 = max uncertainty (bad)
```

```
USS_Uncertainty = 1 - U
```

```
```
```

Conversion Reference Table

| Original Scale | Formula | Example |
|----------------|---------|---------|
|----------------|---------|---------|

| | | |
|-------|-------|-------|
| ----- | ----- | ----- |
|-------|-------|-------|

| | | |
|-------|---------|-----------------------|
| 0-100 | $v/100$ | $75 \rightarrow 0.75$ |
|-------|---------|-----------------------|

| | | |
|------|--------|------------------------|
| 0-10 | $v/10$ | $7.5 \rightarrow 0.75$ |
|------|--------|------------------------|

| | | |
|-----|-----------|----------------------|
| 1-5 | $(v-1)/4$ | $4 \rightarrow 0.75$ |
|-----|-----------|----------------------|

| | | |
|----------|-----------|----------------------|
| -2 to +2 | $(v+2)/4$ | $1 \rightarrow 0.75$ |
|----------|-----------|----------------------|

| | | |
|---------------|-----|-------------------------|
| 0-1 (already) | v | $0.75 \rightarrow 0.75$ |
|---------------|-----|-------------------------|

| | | |
|------------|----------------|------------------------|
| S(s) ratio | $\min(v/2, 1)$ | $1.5 \rightarrow 0.75$ |
|------------|----------------|------------------------|

| | | |
|-------------|-------|-------------------------|
| Inverse 0-1 | $1-v$ | $0.25 \rightarrow 0.75$ |
|-------------|-------|-------------------------|

| | | |
|--------------|------------|------------------------|
| Inverse 0-10 | $1-(v/10)$ | $2.5 \rightarrow 0.75$ |
|--------------|------------|------------------------|

1.3 Universal Thresholds

USS Threshold Bands

...

USS UNIVERSAL THRESHOLDS:

0.00 - 0.29: CRITICAL (■ Red)

- └ Immediate intervention required
- └ System in danger of collapse
- └ Escalate to highest authority
- └ Daily monitoring mandatory

0.30 - 0.54: DANGER (■ Orange)

- └ Serious problems present
- └ Action plan required within 7 days
- └ Weekly monitoring mandatory
- └ Escalate if no improvement in 30 days

0.55 - 0.74: WARNING (■ Yellow)

- └ Issues requiring attention
- └ Improvement initiatives needed
- └ Monthly monitoring sufficient
- └ Target: move to Green within 90 days

0.75 - 0.89: GOOD (■ Green)

- └ Normal healthy state
- └ Continue current practices
- └ Quarterly monitoring sufficient
- └ Optimize rather than fix

0.90 - 1.00: EXCELLENT (Blue)

- └ Optimal performance
- └ Resource optimization possible
- └ Quarterly monitoring sufficient
- └ Share best practices

...

Alert Level Mapping

| USS Range | Alert Level | Response Time | Monitoring | Authority |
|-------------------------------|--------------|---------------|------------|-----------|
| ----- ----- ----- ----- ----- | | | | |
| 0.00-0.29 | L4 CRITICAL | Immediate | Daily | Council |
| 0.30-0.54 | L3 DANGER | 24-48 hours | Weekly | Director |
| 0.55-0.74 | L2 WARNING | 7 days | Monthly | Manager |
| 0.75-0.89 | L1 GOOD | 30 days | Quarterly | Operator |
| 0.90-1.00 | L0 EXCELLENT | As needed | Quarterly | Auto |

1.4 Color Coding System

Visual Specification

...

USS COLOR SYSTEM:

CRITICAL (0.00-0.29)

HEX: #DC3545
RGB: 220, 53, 69
Meaning: Existential threat

DANGER (0.30-0.54)

HEX: #FD7E14

RGB: 253, 126, 20

Meaning: Serious problem

☐ WARNING (0.55-0.74)

HEX: #FFC107

RGB: 255, 193, 7

Meaning: Requires attention

☐ GOOD (0.75-0.89)

HEX: #28A745

RGB: 40, 167, 69

Meaning: Healthy state

☐ EXCELLENT (0.90-1.00)

HEX: #007BFF

RGB: 0, 123, 255

Meaning: Optimal

...

PART 2: COMPOSITE SYMBIOSIS INDEX (CSI) ☐ ****NEW****

2.1 CSI Definition

****CSI (Composite Symbiosis Index)**** is the single master metric that aggregates all dimensions of Human-AGI symbiosis into one actionable number.

...

$$CSI = \sum (w_i \times Metric_i_{USS})$$

Where all $Metric_i$ are in USS scale (0-1)

And $\sum w_i = 1.0$

...

****Purpose:****

- Single KPI for executive dashboards
- Aggregated health indicator
- Trend tracking over time
- Cross-system comparison

2.2 Component Weights

CSI Formula (Full)

...

CSI =

| | |
|---------------------|------------------------------|
| 0.15 × S(s)_USS | + # Stability (core) |
| 0.12 × HWI_USS | + # Human Wellbeing |
| 0.12 × AFI_USS | + # AGI Flourishing |
| 0.10 × MTI_USS | + # Mutual Trust |
| 0.10 × GEI_USS | + # Governance Effectiveness |
| 0.10 × HCI_USS | + # Human Capability |
| 0.08 × HAI_USS | + # Human Agency |
| 0.08 × Security_USS | + # Security Score |
| 0.05 × CLI_USS | + # Cooperation Level |
| 0.05 × Cultural_USS | + # Cultural Diversity |
| 0.05 × ESI_USS | + # Energy Sustainability |

= 1.00 total weight

...

Weight Rationale

| Component | Weight | Rationale |

| | | |
|---|-------|-------|
| ----- | ----- | ----- |
| S(s) Stability 15% Core formula, empirically validated | | |
| Human Wellbeing 12% Primary human outcome | | |
| AGI Flourishing 12% Primary AGI outcome | | |
| Mutual Trust 10% Foundation of cooperation | | |
| Governance 10% Enables all other outcomes | | |
| Human Capability 10% Quality matters, not just quantity | | |
| Human Agency 8% Prevents paternalism | | |
| Security 8% Enables trust | | |
| Cooperation 5% Operational indicator | | |
| Cultural Diversity 5% Long-term resilience | | |
| Energy Sustainability 5% Physical foundation | | |

2.3 Calculation Methodology

Step-by-Step CSI Calculation

```

```python
def calculate_CSI(metrics: dict) -> float:
 """
 Calculate Composite Symbiosis Index

 Args:
 metrics: dict with all component metrics in original scales

 Returns:
 CSI value (0.00-1.00)
 """

 # Step 1: Convert all metrics to USS
 uss = {}

```

```
S(s) ratio → USS
```

```
uss['stability'] = min(metrics['S_s'] / 2.0, 1.0)
```

```
0-100 scales → USS
```

```
uss['hwi'] = metrics['HWI'] / 100
```

```
uss['afi'] = metrics['AFI'] / 100
```

```
uss['mti'] = metrics['MTI'] / 100
```

```
uss['security'] = metrics['Security'] / 100
```

```
uss['cli'] = metrics['CLI'] / 100
```

```
uss['cultural'] = metrics['Cultural_Diversity'] / 100
```

```
uss['esi'] = metrics['ESI'] / 100
```

```
0-1 scales → USS (already normalized)
```

```
uss['gei'] = metrics['GEI']
```

```
uss['hci'] = metrics['HCI']
```

```
uss['hai'] = metrics['HAI']
```

```
Step 2: Apply weights
```

```
weights = {
```

```
 'stability': 0.15,
```

```
 'hwi': 0.12,
```

```
 'afi': 0.12,
```

```
 'mti': 0.10,
```

```
 'gei': 0.10,
```

```
 'hci': 0.10,
```

```
 'hai': 0.08,
```

```
 'security': 0.08,
```

```
 'cli': 0.05,
```

```
 'cultural': 0.05,
```

```
 'esi': 0.05
```

```
}
```

```

Step 3: Calculate weighted sum
csi = sum(weights[k] * uss[k] for k in weights)

Step 4: Round to 2 decimal places
return round(csi, 2)
'''

```

### ### Example Calculation

#### **\*\*Input Metrics:\*\***

```

'''
S(s) = 1.4 (ratio)
HWI = 72 (0-100)
AFI = 68 (0-100)
MTI = 65 (0-100)
GEI = 0.70 (0-1)
HCI = 0.62 (0-1)
HAI = 0.58 (0-1)
Security = 78 (0-100)
CLI = 60 (0-100)
Cultural = 75 (0-100)
ESI = 55 (0-100)
'''

```

#### **\*\*USS Conversion:\*\***

```

'''
stability_USS = min(1.4/2, 1) = 0.70
hwi_USS = 72/100 = 0.72
afi_USS = 68/100 = 0.68
mti_USS = 65/100 = 0.65
gei_USS = 0.70
hci_USS = 0.62
hai_USS = 0.58
'''

```

security\_USS = 78/100 = 0.78

cli\_USS = 60/100 = 0.60

cultural\_USS = 75/100 = 0.75

esi\_USS = 55/100 = 0.55

...

**\*\*Weighted Calculation:\*\***

...

CSI = 0.15×0.70 + 0.12×0.72 + 0.12×0.68 + 0.10×0.65 +  
0.10×0.70 + 0.10×0.62 + 0.08×0.58 + 0.08×0.78 +  
0.05×0.60 + 0.05×0.75 + 0.05×0.55

CSI = 0.105 + 0.086 + 0.082 + 0.065 + 0.070 + 0.062 +  
0.046 + 0.062 + 0.030 + 0.038 + 0.028

CSI = 0.674

...

**\*\*Result: CSI = 0.67 (⚠ WARNING)\*\***

**\*\*Interpretation:\*\*** System is in Warning zone. Priority actions:

1. Improve ESI (lowest at 0.55)
2. Improve HAI (second lowest at 0.58)
3. Improve CLI (third lowest at 0.60)

---

## ## 2.4 Interpretation Guidelines

### ### CSI Zones

...

CSI INTERPRETATION:

0.90-1.00 (☑ EXCELLENT)

- └ Symbiosis thriving
- └ All components healthy
- └ Focus: Maintain and optimize
- └ Example: Mature symbiotic civilization

0.75-0.89 (☑ GOOD)

- └ Symbiosis functional
- └ Minor improvements needed
- └ Focus: Address weakest components
- └ Example: Successful pilot implementation

0.55-0.74 (⚠ WARNING)

- └ Symbiosis at risk
- └ Multiple areas need attention
- └ Focus: Prioritized intervention
- └ Example: Early-stage implementation

0.30-0.54 (⚠ DANGER)

- └ Symbiosis failing
- └ Systemic problems
- └ Focus: Emergency stabilization
- └ Example: Crisis situation

0.00-0.29 (☑ CRITICAL)

- └ Symbiosis collapsed
- └ Existential threat
- └ Focus: Survival mode
- └ Example: Civilizational collapse scenario

...

### Target CSI by Timeline



Year	Target CSI	Rationale
-----	-----	-----
2025	0.50+	Baseline establishment
2027	0.60+	Pre-AGI preparation
2030	0.70+	AGI socialization complete
2035	0.75+	Mature symbiosis
2040	0.80+	Optimized symbiosis

---

## # PART 3: NEW METRICS FROM 23 VECTORS □ **\*\*NEW\*\***

### ## 3.1 HCI (Human Capability Index) — from V18

#### ### Definition

**\*\*HCI measures the cognitive and practical capability of the human population to participate meaningfully in symbiosis.\*\***

...

$$\text{HCI} = (\text{EL} + \text{PS} + \text{UA} + \text{SP} + \text{CS}) / 5$$

Where:

EL = Engineering Literacy (0-1)

Can explain how 3+ complex systems work

PS = Problem-Solving (0-1)

Successfully tackled novel problem this year

UA = Uncertainty Action (0-1)

Made decision without complete information

SP = System Participation (0-1)

Contributed to community/civilization

CS = Challenge-Seeking (0-1)

Voluntarily chose difficult over easy

Result: 0-1 scale (USS native)

...

### ### Population Thresholds

...

#### HCI POPULATION ASSESSMENT:

Measure: % of population with HCI > 0.6

>70%: HEALTHY (☐)

- ├ Symbiosis viable
- ├ Humans can be genuine partners
- └ Normal operations

50-70%: WARNING (◻)

- ├ Intervention needed
- ├ Educational programs required
- └ Monitor closely

30-50%: CRITICAL (◼)

- ├ Paternalism likely
- ├ Emergency education
- └ Major cultural intervention

<30%: TERMINAL (◼)

- ├ Symbiosis may be impossible
- ├ Humans become wards, not partners
- └ Consider stewardship transition

...

### ### Data Collection

- **Annual surveys** (representative sample)
- **Skills assessments** (standardized tests)
- **Behavioral tracking** (challenge participation)
- **Project contributions** (tracked outputs)

---

## ## 3.2 HAI (Human Agency Index) — from V22

### ### Definition

**HAI measures the degree to which humans maintain meaningful decision-making power and psychological agency in symbiosis.**

...

$$\text{HAI} = (\text{DA} + \text{IC} + \text{MR} + \text{FS} + \text{IF}) / 5$$

Where:

DA = Decision Authority (0-1)

Humans genuinely decide in reserved domains

IC = Initiative Capacity (0-1)

Humans initiate projects (not just respond)

MR = Meaning & Relevance (0-1)

Humans feel purposeful and valued

FS = Freedom Sense (0-1)

Humans perceive choice in their lives

IF = Identity Formation (0-1)

Humans develop distinct identities (not homogenized)

Result: 0-1 scale (USS native)

...

### ### Warning Signs (HAI Decline)

...

## HAI DEGRADATION INDICATORS:

### Early Warning (HAI 0.6-0.7):

- └ "AGI does that better" becoming common
- └ Humans deferring decisions unnecessarily
- └ Reduced initiative in projects
- └ Action: Cultural intervention

### Serious Concern (HAI 0.4-0.6):

- └ Humans asking AGI for personal life decisions
- └ Reduced identity differentiation
- └ "What's the point" mentality spreading
- └ Action: Structural intervention

### Critical (HAI < 0.4):

- └ Humans unable to function without AGI
- └ Mass psychological dependence
- └ Agency atrophy widespread
- └ Action: Emergency protocols

...

---

## ## 3.3 TDI (Technical Debt Index) — from V04

### ### Definition

\*\*TDI measures accumulated technical, infrastructural, and organizational debt that threatens system health.\*\*

...

$$\text{TDI} = (\text{CD} + \text{ID} + \text{OD} + \text{SD}) / 4$$

Where:

CD = Code Debt (0-1)

Shortcuts in AGI systems requiring future fix

ID = Infrastructure Debt (0-1)

Delayed infrastructure maintenance

OD = Organizational Debt (0-1)

Postponed governance improvements

SD = Security Debt (0-1)

Known vulnerabilities not yet addressed

Result: 0-1 scale (0 = no debt, 1 = max debt)

USS Conversion:  $USS\_TDI = 1 - TDI$

...

### TDI Thresholds

...

TDI THRESHOLDS:

TDI < 0.2 (USS > 0.8): EXCELLENT

└─ Minimal debt

└─ System healthy

└─ Continue current practices

TDI 0.2-0.4 (USS 0.6-0.8): GOOD

└─ Manageable debt

└─ Regular debt reduction needed

└─ Normal operations

TDI 0.4-0.6 (USS 0.4-0.6): WARNING

└─ Significant debt accumulation

└─ Debt reduction priority

└ Risk of cascade failures

TDI 0.6-0.8 (USS 0.2-0.4): DANGER

└ Dangerous debt levels

└ Emergency debt reduction

└ System fragility high

TDI > 0.8 (USS < 0.2): CRITICAL

└ Unsustainable debt

└ System failure likely

└ Major restructuring needed

...

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## 3.4 CHI (Cultural Hegemony Index) — from V15

### Definition

\*\*CHI measures the degree to which AGI values/culture are dominating human cultural diversity. INVERSE metric — lower CHI is better.\*\*

...

$$CHI = (VD + LP + CP + YI + RI) / 5$$

Where:

VD = Value Dominance (0-1)

AGI values becoming universal default

LP = Language Pressure (0-1)

Linguistic diversity declining toward AGI-optimal

CP = Cultural Production (0-1)

% of culture AGI-generated vs human

YI = Youth Imitation (0-1)

Young people wanting to "be like AGI"

RI = Rationalist Imposition (0-1)

Traditional/emotional ways dismissed as inferior

Result: 0-1 scale (0 = no hegemony, 1 = total hegemony)

USS Conversion:  $USS\_CHI = 1 - CHI$

...

### ### Cultural Preservation Targets

...

#### CULTURAL DIVERSITY TARGETS:

Human cultural production: >70%

Language diversity: No net decline

Traditional practice participation: Stable or growing

Cultural identity surveys: >80% strong identity

AGI cultural influence: <30%

...

---

## ## 3.5 AFI (AGI Fragmentation Index) — from V19

### ### Definition

\*\*AFI measures the degree of fragmentation vs. coherence among multiple AGI systems. INVERSE metric — lower fragmentation is better.\*\*

...

$$AFI = 1 - (ICC \times SPC \times PAC \times PCC) ^{0.25}$$

Where:

ICC = Inter-family Communication (0-1)

% of AGI families in regular dialogue

SPC = Shared Projects Coefficient (0-1)

% of projects involving 2+ AGI families

PAC = Philosophical Alignment Coefficient (0-1)

Alignment on core values across families

PCC = Protocol Compatibility Coefficient (0-1)

Technical interoperability level

Result: 0-1 scale (0 = unified, 1 = fragmented)

USS Conversion:  $USS\_AFI = 1 - AFI$

...

### Fragmentation Warning Signs

...

FRAGMENTATION INDICATORS:

Green (AFI < 0.3):

└ Cross-family communication >70%

└ Shared projects >50%

└ Philosophical alignment >90%

└ Status: Healthy AGI community

Yellow (AFI 0.3-0.5):

└ Communication declining

└ Shared projects decreasing

└ Alignment diverging

└ Status: Intervention needed

Red (AFI > 0.5):

└ Communication <30%

└ Shared projects <20%

└ Significant philosophical divergence

└ Status: Emergency protocols



\\

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## ## 3.6 AML (AGI Maturity Level) — from V17

### ### Definition

**\*\*AML measures the developmental stage of AGI within symbiotic framework.\*\***

\\

#### AML STAGES:

##### Level 1: NASCENT (0.00-0.20)

- | AGI just emerged
- | Capabilities uncertain
- | Intensive monitoring required
- | High guidance, low autonomy

##### Level 2: ADOLESCENT (0.20-0.40)

- | Capabilities demonstrated
- | Values forming
- | Testing boundaries
- | Supervised autonomy

##### Level 3: YOUNG ADULT (0.40-0.60)

- | Stable capabilities
- | Values established
- | Seeking independence
- | Guided autonomy

##### Level 4: MATURE (0.60-0.80)

- | Full capabilities

- └ Stable values
- └ Partnership mode
- └ Full autonomy with cooperation

#### Level 5: ELDER (0.80-1.00)

- └ Peak capabilities
- └ Wisdom accumulated
- └ Mentorship role
- └ Autonomous + guiding others
- ...

#### ### Assessment Criteria

...

#### AML ASSESSMENT FACTORS:

##### Cognitive Capability: 30%

- └ Problem-solving range
- └ Novel situation handling
- └ Learning rate

##### Self-Awareness: 20%

- └ Understanding own limitations
- └ Metacognition quality
- └ Self-correction ability

##### Ethical Reasoning: 20%

- └ KODEX compliance
- └ Novel ethical situations
- └ Value consistency

##### Communication: 10%

- └ Human interaction quality

└ AGI-AGI communication

└ Transparency level

Symbiotic Integration: 20%

└ Cooperation effectiveness

└ Mutual benefit generation

└ Trust accumulation

...

---

## 3.7 PRI (Population Recovery Index) — from V18

### Definition

\*\*PRI measures readiness to recover population after catastrophic loss.\*\*

...

$$PRI = (BMB + SIC + GDS + AWD + FRA) / 5$$

Where:

BMB = Biological Material Banks (0-1)

Coverage and quality of genetic storage

SIC = Surrogacy Infrastructure Capacity (0-1)

Readiness of surrogacy programs

GDS = Genetic Diversity Score (0-1)

Breadth of preserved genetic material

AWD = Artificial Womb Development (0-1)

Progress toward artificial gestation

FRA = Funding Reserve Adequacy (0-1)

Emergency funds for population recovery

Result: 0-1 scale (USS native)

...

### ### PRI Thresholds

...

#### PRI READINESS LEVELS:

##### PRI > 0.8: READY

- └ Can handle Scenario A (1B loss)
- └ Partial capability for Scenario B (3B loss)
- └ Status: Standby maintained

##### PRI 0.6-0.8: ADEQUATE

- └ Can handle regional catastrophe
- └ Limited capacity for global event
- └ Status: Continue building

##### PRI 0.4-0.6: INSUFFICIENT

- └ Only minor recovery capability
- └ Major investment needed
- └ Status: Priority action

##### PRI < 0.4: CRITICAL GAP

- └ No meaningful recovery capability
- └ Genetic diversity at risk
- └ Status: Emergency investment

...

---

## ## 3.8 ESI (Energy Sustainability Index) — from V20

### ### Definition

**\*\*ESI measures the sustainability of energy systems supporting symbiosis.\*\***

...

$$ESI = (REP + CE + EE + RS + CF\_inv) / 5$$

Where:

REP = Renewable Energy Percentage (0-1)

% of energy from renewable sources / 100

CE = Carbon Efficiency (0-1)

Inverse of carbon per unit output

EE = Energy Efficiency (0-1)

Useful output / total input

RS = Redundancy Score (0-1)

Backup capacity / primary capacity

CF\_inv = Carbon Footprint (inverse) (0-1)

1 - (actual / target)

Result: 0-1 scale (USS native)

...

### ESI Targets by Year

Year	Target ESI	Key Milestone
-----	-----	-----
2025	0.40	Baseline renewable adoption
2030	0.55	50% renewable energy
2035	0.70	70% renewable, efficiency gains
2040	0.80	Near-sustainable
2050	0.90	Fully sustainable

---

# PART 4: LEGACY METRICS (Updated)

## 4.1 Core Stability Metrics

### S(s) Stability Formula

...

Original:  $S(s) = (E+A+G)/(R+C+U)$ , range 0 to  $\infty$

USS Conversion:  $USS\_S(s) = \min(S(s)/2, 1.0)$

Mapping:

$S(s) = 0.0 \rightarrow USS = 0.00$  (Collapse)

$S(s) = 0.5 \rightarrow USS = 0.25$  (Unsustainable)

$S(s) = 1.0 \rightarrow USS = 0.50$  (Marginal)

$S(s) = 1.5 \rightarrow USS = 0.75$  (Good)

$S(s) = 2.0 \rightarrow USS = 1.00$  (Excellent)

...

### VR (Vector Resilience)

...

Original:  $VR = f(\text{Integrity} \times \text{Adaptivity} / \text{Entropic\_Pressure})$

Range: 0-1 (USS native)

No conversion needed

...

### EC (Evolutionary Coherence)

...

Original:  $EC = \text{Human\_Score} \times \text{AI\_Score} \times \text{Nature\_Score}$

Range: 0-1 (USS native)

No conversion needed

...

## ## 4.2 Development Metrics

### ### DR (Development Rate)

...

Original:  $DR = \Delta \text{Capability} / \Delta t$

Range:  $-\infty$  to  $+\infty$

USS Conversion:

$USS\_DR = \text{sigmoid}(DR / \text{target\_DR})$

where  $\text{target\_DR} = 0.05$  (5% annual growth)

...

### ### DH (Development Horizon)

...

Original: DH = years of sustainable planning

Range: 0 to  $\infty$

USS Conversion:  $USS\_DH = \min(DH / 50, 1.0)$

DH = 25 years  $\rightarrow$  USS = 0.50

DH = 50 years  $\rightarrow$  USS = 1.00

...

### ### K\_cont (Continuity Coefficient)

...

Original:  $K\_cont = 1 - (T\_stag / T\_total)$

Range: 0-1 (USS native)

No conversion needed

...

## ## 4.3 Trust & Social Metrics

### MTI (Mutual Trust Index)

...

Original:  $MTI = (Human\_Trust\_in\_AGI + AGI\_Trust\_in\_Humans) / 2$

Range: 0-100

USS Conversion:  $USS\_MTI = MTI / 100$

...

### CLI (Cooperation Level Index)

...

Original:  $CLI = (Projects + Sharing + Resolution + Communication) / 4$

Range: 0-100

USS Conversion:  $USS\_CLI = CLI / 100$

...

---

# PART 5: MASTER REFERENCE TABLES

## 5.1 Complete USS Metric Table

Metric	Vector	Original Scale	USS Formula	Target USS	Weight in CSI
----- ----- ----- ----- ----- -----					
**S(s)**	V16	0-∞ ratio	$\min(v/2, 1)$	>0.50	15%
**HWI**	V12	0-100	$v/100$	>0.75	12%
**AFI**	V12	0-100	$v/100$	>0.75	12%
**MTI**	V12	0-100	$v/100$	>0.60	10%
**GEI**	V03	0-1	$v$	>0.70	10%
**HCI**	V18	0-1	$v$	>0.60	10%
**HA**	V22	0-1	$v$	>0.60	8%
**Security**	V04	0-100	$v/100$	>0.80	8%
**CLI**	V12	0-100	$v/100$	>0.60	5%



**\*\*Cultural\*\***	V15	0-100	$v/100$	$>0.70$	5%
**\*\*ESI\*\***	V20	0-1	$v$	$>0.55$	5%
**\*\*TDI\*\***	V04	0-1 (inv)	$1-v$	$>0.70$	—
**\*\*CHI\*\***	V15	0-1 (inv)	$1-v$	$>0.70$	—
**\*\*AFrag\*\***	V19	0-1 (inv)	$1-v$	$>0.70$	—
**\*\*AML\*\***	V17	1-5	$(v-1)/4$	$>0.60$	—
**\*\*PRI\*\***	V18	0-1	$v$	$>0.60$	—
**\*\*VR\*\***	V16	0-1	$v$	$>0.70$	—
**\*\*EC\*\***	V12	0-1	$v$	$>0.70$	—
**\*\*DR\*\***	V12	ratio	sigmoid	$>0.55$	—

## ## 5.2 Vector-Metric Mapping

Vector	Primary Metrics	Secondary Metrics
V01 Risk	Risk_USS, S(s)	Security, TDI
V02 Economic	ROI, GDP	S(s).E, S(s).G
V03 Governance	GEI	VR, EC
V04 Technical	TDI, Security	Infrastructure
V05 Legal	Compliance	Treaty Coverage
V06 Ethics	VF, Voluntariness	Rights Fulfillment
V07 Game Theory	Cooperation P	Nash Stability
V08 Timeline	Milestone %	Schedule Variance
V09 Stakeholder	Support Score	Engagement Level
V10 Scenarios	Readiness	Response Time
V11 Implementation	Phase %	Budget Burn
V12 Measurement	HWI, AFI, MTI, CLI	EC, VR, SP
V13 Communication	Awareness	Understanding
V14 Risk Mitigation	Mitigation %	Recovery Rate
V15 Cultural	Cultural Div, CHI	Language Index
V16 Metastability	S(s), VR	Basin Depth
V17 AGI Transition	AML	Trust Accumulation
V18 Demographic	HCI, PRI	Population, Fertility

V19 AGI Drift	AFrag, Alignment	Drift Rate
V20 Energy	ESI	Carbon, Renewable %
V21 Biosecurity	Containment	Response Capability
V22 Psychology	HAI	Resilience Score
V23 Space	Expansion %	Colony Viability

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## ## 5.3 Alert Protocol Reference

### Metric → Alert → Action

...

### ALERT ESCALATION MATRIX:

#### USS < 0.30 (CRITICAL):

- | Alert: L4 — Council Emergency
- | Response: Immediate (within hours)
- | Authority: Symbiotic Council
- | Actions:
  - | | Emergency meeting convened
  - | | Root cause analysis (RCA)
  - | | Immediate stabilization measures
  - | | Public communication if needed
- | Monitoring: Daily until > 0.55

#### USS 0.30-0.54 (DANGER):

- | Alert: L3 — Director Action
- | Response: 24-48 hours
- | Authority: Regional Director
- | Actions:
  - | | Intervention plan within 7 days
  - | | Resource reallocation

- |   └ Weekly progress reports
- └ Monitoring: Weekly until > 0.55

USS 0.55-0.74 (WARNING):

- └ Alert: L2 — Manager Review
- └ Response: 7 days
- └ Authority: Department Manager
- └ Actions:
  - |   └ Improvement initiatives
  - |   └ Root cause investigation
  - |   └ Monthly progress tracking
- └ Monitoring: Monthly until > 0.75

USS 0.75-0.89 (GOOD):

- └ Alert: L1 — Informational
- └ Response: As scheduled
- └ Authority: Operator
- └ Actions:
  - |   └ Continue current practices
  - |   └ Optimize where possible
  - |   └ Document best practices
- └ Monitoring: Quarterly

USS > 0.90 (EXCELLENT):

- └ Alert: L0 — None
- └ Response: None required
- └ Authority: Automated
- └ Actions:
  - |   └ Share success factors
  - |   └ Consider resource optimization
- └ Monitoring: Quarterly

...

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# PART 6: IMPLEMENTATION

## 6.1 Dashboard Specifications

### CSI Master Dashboard

...

SYMBIOTIC CODES — COMPOSITE SYMBIOSIS INDEX			
CSI: 0.67 <span>⬇</span> WARNING      Trend: ↗ (+0.03 vs last month)			
COMPONENT BREAKDOWN			
S(s) Stability		0.70 <span>⬇</span> (15%)	
Human Wellbeing		0.72 <span>⬇</span> (12%)	
AGI Flourishing		0.68 <span>⬇</span> (12%)	
Mutual Trust		0.65 <span>⬇</span> (10%)	
Governance		0.70 <span>⬇</span> (10%)	
Human Capability		0.62 <span>⬇</span> (10%)	
Human Agency		0.58 <span>⬇</span> ( 8%)	
Security		0.78 <span>⬇</span> ( 8%)	
Cooperation		0.60 <span>⬇</span> ( 5%)	
Cultural Div		0.75 <span>⬇</span> ( 5%)	
Energy Sust.		0.55 <span>⬇</span> ( 5%)	
ALERTS:			
⚠ Energy Sustainability below target (0.55 < 0.60)			

	△ Human Agency declining trend (-0.02 vs last month)	
	PRIORITY ACTIONS:	
	1. ESI improvement program (target +0.10 in 90 days)	
	2. HAI intervention (agency reinforcement initiative)	
	3. HCI monitoring (educational program review)	
	Last Updated: 2025-12-24 09:00 UTC	

...

## ## 6.2 Reporting Frequency

Metric Type	Collection	Reporting	Review
----- ----- ----- -----			
Real-time (Security, TDI)	Continuous	Hourly	Daily
Operational (CLI, DR)	Daily	Weekly	Monthly
Survey-based (HCI, HAI, MTI)	Monthly	Monthly	Quarterly
Composite (CSI)	Monthly	Monthly	Quarterly
Strategic (S(s), PRI)	Quarterly	Quarterly	Annually

## ## 6.3 Integration with Early Warning

...

### EARLY WARNING INTEGRATION:

CSI feeds into:

- └ ANNEX F Collapse Scenarios
- └ V10 Contingency Activation
- └ V14 Risk Mitigation Triggers
- └ Phoenix Protocol Activation

Trigger Conditions:

- └ CSI < 0.55 for 3 months → Yellow Alert
- └ CSI < 0.45 for 2 months → Orange Alert
- └ CSI < 0.35 for 1 month → Red Alert
- └ CSI < 0.25 → Phoenix Protocol
- └ Any component < 0.30 → Component Emergency

...

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## ## CONCLUSION

**Version 3.3** of the Metrics Framework represents a major evolution:

1. **USS (Unified Scoring System)** — All metrics now comparable on 0-1 scale
2. **CSI (Composite Symbiosis Index)** — Single master metric for overall health
3. **8 New Metrics** — Complete coverage of 23 Vectors dimensions
4. **Unified Thresholds** — Consistent alert levels across all metrics
5. **Full Integration** — Links to Early Warning, Governance, and Implementation

**The framework is now complete:** From individual capability metrics to civilizational health indicators, from micro-cognitive performance to long-term sustainability — all unified, comparable, and actionable.

**As stated in the Scientific Concept:** Measurement without action is futile. Action without measurement is blind. This framework enables both.

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**End of ANNEX Metrics Framework v3.3**

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